CLAIMS

What is claimed is:

1. A head-related transfer function model for use with 3D sound applications, comprising:

a plurality of Eigen filters;

a plurality of spatial characteristic functions are adapted to be respectively combined with said plurality of Eigen filters; and

a plurality of regularizing models adapted to regularize said plurality of spatial characteristic functions prior to said respective combination with said plurality of Eigen filters.

2. The head-related transfer function model for use with 3D sound applications according to claim 1, further comprising:

a summer adapted to sum said plurality of combined Eigen filters combined with said plurality of regularized spatial characteristic functions to provide said head-related transfer function model.

3. The head-related transfer function model for use with 3D sound applications according to claim 1, wherein:

said plurality of regularizing models are each adapted to perform a generalized spline model.

4. The head-related transfer function model for use with 3D sound applications according to claim 1, further comprising:

a smoothness control in communication with said plurality of regularizing models to allow control of a trade-off between localization and smoothness of said head-related transfer function.

5. A head-related impulse response model for use with 3D sound applications, comprising:

a plurality of Eigen filters;

a plurality of spatial characteristic functions are adapted to be respectively combined with said plurality of Eigen filters; and

a plurality of regularizing models adapted to regularize said plurality of spatial characteristic functions prior to said respective combination with said plurality of Eigen filters.

6. The head-related impulse response model for use with 3D sound applications according to claim 5, further comprising:

a summer adapted to sum said plurality of combined Eigen filters combined with said plurality of regularized spatial characteristic functions to provide said head-related impulse response model.

7. The head-related impulse response model for use with 3D sound applications according to claim 5, wherein:

said plurality of regularizing models are each adapted to perform a generalized spline model.

8. The head-related transfer function model for use with 3D sound applications according to claim 5, further comprising:

a smoothness control in communication with said plurality of regularizing models to allow control of a trade-off between localization and smoothness of said head-related transfer function.

9. A method of determining spatial characteristic sets for use in a head-related transfer function model, comprising:

constructing a covariance data matrix of a plurality of measured head-related transfer functions;

performing an Eigen decomposition of said covariance data matrix to provide a plurality of Eigen vectors;

determining at least one principal Eigen vector from said plurality of Eigen vectors; and

back-projecting said measured head-related transfer functions to said at least one principal Eigen vector to create said spatial characteristic sets.

10. A method of determining spatial characteristic sets for use in a head-related impulse response model, comprising:

constructing a covariance data matrix of a plurality of measured head-related impulse responses;

performing an Eigen decomposition of said covariance data matrix to provide a plurality of Eigen vectors;

determining at least one principal Eigen vector from said plurality of Eigen vectors; and

back-projecting said measured head-related impulse responses to said at least one principal Eigen vector to create said spatial characteristic sets.

11. Apparatus for determining spatial characteristic sets for use in a head-related transfer function model, comprising:

means for constructing a covariance data matrix of a plurality of measured head-related transfer functions;

means for performing an Eigen decomposition of said covariance data matrix to provide a plurality of Eigen vectors;

means for determining at least one principal Eigen vector from said plurality of Eigen vectors; and

means for back-projecting said measured head-related transfer functions to said at least one principal Eigen vector to create said spatial characteristic sets.

12. Apparatus for determining spatial characteristic sets for use in a head-related impulse response model, comprising:

means for constructing a covariance data matrix of a plurality of measured head-related impulse responses;

means for performing an Eigen decomposition of said covariance data matrix to provide a plurality of Eigen vectors;

means for determining at least one principal Eigen vector from said plurality of Eigen vectors; and

means for back-projecting said measured head-related impulse responses to said at least one principal Eigen vector to create said spatial characteristic sets.